PRICE 15¢

TECHNOLOGY DEPT:

PUBLIC LIBRARY
JAN 2[illegible] 1939
DETROIT

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •

January 28, 1939

Fabulous But Real

See Page 37

A SCIENCE SERVICE PUBLICATION

Do You Know?

When fleece is shorn off a sheep, 30 to 70 per cent. of the weight is foreign matter.

Green outer leaves of lettuce contain 30 times as much vitamin A as the white inner leaves.

A pygmy sperm whale only eight feet long has been sent to the Academy of Natural Sciences of Philadelphia.

A simple chemical method for testing ripeness of grapes is being sought by New York State agricultural chemists.

Cornell University holds a four-day course every January for florists who want to keep up with new flowers and trade problems.

Algebraic words have been found in Babylonian records, and the name algebra itself is believed by some scholars to come from a Babylonian term for equation.

The population of the continental United States increased seven-tenths of one per cent. in the past year, according to the estimate of 130,215,000 people as of July 1, 1938.

Lake Dwellings built in the New Stone Age in Europe were not set on piles over the water, as was once supposed; instead, they were built over dry land at the edge of lakes, and were set high for protection from floods and dampness.

QUESTIONS DISCUSSED IN THIS ISSUE

Most articles which appear in SCIENCE NEWS LETTER *are based on communications to Science Service, or on papers before meetings. Where published sources are used they are referred to in the article.*

AGRICULTURE

How were most crop improvements effected? p. 53.

ANTHROPOLOGY

What is the Tena Indian word for Friday? p. 52.
How are the recently found African skulls like those of Java ape-man? p. 54.

ASTRONOMY

In what way does the calculated curvature of space fail to fit its contents? p. 55.
Where did the star Algol get its name? p. 58.

BOTANY

How did potatoes get to Virginia? p. 57.
Where did poinsettias come from? p. 63.

CHEMISTRY

What is phosgene made of? p. 60.

CONSERVATION

How can picnickers be taught greater care with fires? p. 52.

ENGINEERING

What did a good car cost in 1925? p. 60.

ENGINEERING—PSYCHOLOGY

What is "see-level"? p. 62.

ETHNOLOGY

What did 16th-century China know of Mexico? p. 54.

GENERAL SCIENCE

Are facts ever taboo in science? p. 56.

GEOLOGY

Where are engineers having trouble with the Ice Age? p. 55.

MATHEMATICS

What are "branch points"? p. 63.

MEDICINE

What is the "blood-brain barrier"? p. 51.
What are the symptoms of true influenza? p. 52.

METALLURGY

What is going to cause a boom in magnesium? p. 56.

METEOROLOGY

What is a radiosonde? p. 56.

MINING

Where can safety be had in bags? p. 62.

PALEONTOLOGY

When did the dodo become extinct? p. 57.

PHYSICS

How can magnetism be used in traffic control? p. 54.
What are Cerenkov rays? p. 59.
How high a vacuum can now be created? p. 61.

POPULATION

What percentage of the U. S. population is Negro? p. 56.

PSYCHIATRY

Who is seeking causes for nervous breakdown? p. 62.

PSYCHOLOGY

What does mannose taste like? p. 51.
Are averages always useful? p. 57.

PUBLIC HEALTH

Was 1938 a good year for babies? p. 53.
Where have men suffered to make themselves beautiful? p. 61.

SEISMOLOGY

What has the moon to do with earthquakes? p. 57.

A Soviet salvaging expedition which recently hauled up a steamer sunk in the Black Sea in 1920 found the ship sunk into the sea bottom 16 feet deep.

The streets where Jesus walked when in Jerusalem are now many feet below the present surface, explains Prof. Millar Burrows of Yale.

SCIENCE NEWS LETTER

Vol. 35 JANUARY 28, 1939 *No. 4*

The Weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 2101 Constitution Avenue, Washington, D. C. *Edited by* WATSON DAVIS.

Subscriptions—$5.00 a year; two years $7.00; 15 cents a copy. Ten or more copies to same address, 5 cents a copy. Back numbers more than six months old, 25 cents.

Members of the American Association for the Advancement of Science have privilege of subscribing to SCIENCE NEWS LETTER at the reduced price of $3 per year. Applications for this privilege should be accompanied by privilege card obtained from the Permanent Secretary, A.A.A.S., Smithsonian Institution Building, Washington, D. C.

In requesting change of address, please give your old address as well as the new one, at least two weeks before change is to become effective.

Copyright, 1939, by Science Service, Inc. Republication of any portion of SCIENCE NEWS LETTER is strictly prohibited. Newspapers, magazines and other publications are invited to avail themselves of the numerous syndicate services issued by Science Service.

Cable address: Scienserve, Washington.

Entered as second class matter at the postoffice at Washington, D. C., under the act of March 3, 1879. Established in mimeographed form March 18, 1922. Title registered as trademark. U. S. and Canadian Patent Offices. Indexed in Readers' Guide to Periodical Literature and in the Engineering Index.

Advertising rates on application. Member Audit Bureau of Circulation.

SCIENCE SERVICE is the Institution for the Popularization of Science organized 1921 as a non-profit corporation, with trustees nominated by the National Academy of Sciences, the National Research Council, the American Association for the Advancement of Science, the E. W. Scripps Estate and the journalistic profession.

Board of Trustees—*Honorary President*: William E. Ritter, University of California. Representing the American Association for the Advancement of Science, J. McKeen Cattell, Editor, Science, Garrison, N. Y.; Henry B. Ward, University of Illinois, Urbana, Ill.; Edwin G. Conklin, *President*, American Philosophical Society, Philadelphia, Pa. Representing the National Academy of Sciences, W. H. Howell, *Vice-President and Chairman of Executive Committee*, Johns Hopkins University, Baltimore, Md.; R. A. Millikan, Director, Norman Bridge Laboratory of Physics, California Institute of Technology, Pasadena, Calif.; Harlow Shapley, Director, Harvard College Observatory, Cambridge, Mass. Representing National Research Council, C. G. Abbot, Secretary, Smithsonian Institution, Washington, D. C.; Harrison E. Howe, Editor of Industrial and Engineering Chemistry, Washington, D. C.; Ross G. Harrison, Director, Osborn Zoological Laboratory, Yale University, New Haven, Conn. Representing Journalistic Profession, John H. Finley, Editor, New York Times; J. Edwin Murphy, Managing Editor, Baltimore Evening Sun, Baltimore, Md.; O. W. Riegel, Director, Lee School of Journalism, Washington and Lee University, Lexington, Va. Representing E. W. Scripps Estate, Harry L. Smithton, *Treasurer*, Cincinnati, Ohio; Warren S. Thompson, Miami University, Oxford, Ohio.

Staff—Director, Watson Davis; Writers, Frank Thone, Emily C. Davis, Jane Stafford, Marjorie Van de Water, Robert Potter, Leonard H. Engel; Correspondents in principal cities and centers of research. Photography: Fremont Davis; Librarian: Minna Gill; Sales and Advertising: Hallie Jenkins, Austin Winant, Howard Bandy.

MEDICINE

Blood-Brain Barrier Studied In Infantile Paralysis Fight

Needs Include Diagnostic Test in Doubtful Cases, Method For Reaching Nerve Cells With Protector

A NATION-WIDE drive against terrifying infantile paralysis is focused, right now, on a campaign for funds to finance the fight. But the fight itself must be directed by medical scientists and based on their investigations.

Imperative needs on the scientific side of the fight are: (1) a diagnostic test for the disease in cases that show few and vague symptoms; and (2) a way of getting a protective or curative substance to the nerve cells themselves "where the deadly virus exerts its inexorable wrecking activities."

Both needs, it appears, may be met by study of the blood-brain barrier, such as that being made by Dr. Edwin H. Lennette of the Washington University School of Medicine at St. Louis, Mo. This is one of the universities that has been given a grant by the National Foundation for Infantile Paralysis, Inc., to pursue research on the crippling malady.

Dr. Lennette explains the blood-brain barrier and its importance in the following terms:

"It has long been known that in the normal individual there exists a mechanism which keeps foreign substances in the blood from reaching the easily harmed tissues of the brain and spinal cord. However, when certain structures, such as the delicate membranes enclosing the brain and spinal cord, are irritated or inflamed, the all-important function of this barrier is disrupted. The degree of upset is parallel, roughly, to the amount of irritation, and substances which previously could not pass through the barrier now do so with ease, and can be demonstrated in the spinal canal.

"In the various diseases which are frequently confused with infantile paralysis may there not be a difference in the *rate* and amount with which these foreign substances pass the filtering barrier? If so, this might be of value in diagnosis; all that need be done is to feed or inject the foreign material, later tap the spinal canal and determine how much of the substance had passed into the spinal canal in a given time."

First results in the search for a chemical that would test the permeability of the blood-brain barrier were disheartening, Dr. Lennette reports. Then he discovered that sodium bromide could be used if the ratio of sodium bromide in the spinal fluid to that in the blood was determined. This did show a difference between sick and well monkeys and worked so well that the chemist could make a diagnosis from his analysis. The next step will be to determine what permeability quotients other diseases will give so as to have a basis for comparison with infantile paralysis.

So much for diagnosis, says Dr. Lennette. On the problem of treatment or prevention of infantile paralysis, he points out that if the barrier between the blood and the brain could be altered at will, it would probably be possible to mobilize defensive aids at the points where they are most needed.

Vaccines, he says, have thus far "yielded little promise in the fight to subdue infantile paralysis." They have failed because they do not immunize the tissues they were designed to protect, that is, the vulnerable nervous system.

"If we can devise a means of immunizing the susceptible nerve cells," Dr. Lennette states, "we shall have gone a long way in specific prophylaxis (prevention). What role the blood-brain barrier may play in such a measure is under study at present."

Science News Letter, January 28, 1939

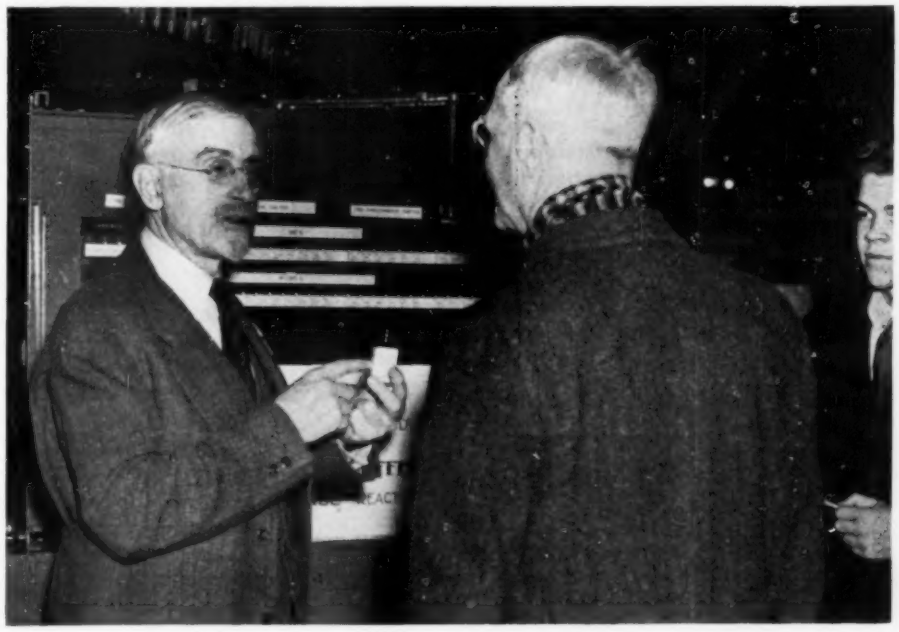
PSYCHOLOGY

Poll of 3121 Persons Shows Wide Variation in Tastes

MANNOSE, an unusual sugar that does not occur in nature and is produced only in the chemical laboratory, provoked 25 different kinds of taste responses when tried on scientists and visitors at the recent meeting of the American Association for the Advancement of Science.

Dr. A. F. Blakeslee, of the Carnegie Institution of Washington laboratories, Cold Spring Harbor, New York, conducted a poll of all comers who were willing to taste samples of the compound. He used a regular voting machine, and has just reported the results to Science Service.

There are five possible simple responses to mannose by the tongues of various persons: tasteless, sweet, bitter,



A PLEBISCITE OF TASTES

Dr. A. F. Blakeslee of the Carnegie Institution of Washington tested the taste reactions of hundreds of persons at the Richmond, Va., meeting of the AAAS, registering them on a standard voting machine.

sour, salty. Of the 3121 persons who volunteered to taste, 895 found the mannose tablets tasteless, 1120 said they were sweet, 352 declared them bitter, 93 called them sour, and 38 tasted them as salty.

Combinations of tastes are possible to a good many persons. Two or more tastes may come either successively or simultaneously.

Of successive tastes, 90 were reported as bitter then sweet, 12 as bitter then sour, 14 as bitter then salty, 286 as sweet then bitter, 40 as sweet then sour, 41 as sweet then salty, 9 as sour then bitter, 18 as sour then sweet, 2 as sour then salty, 6 as salty then bitter, 6 as salty then sweet, 2 as salty then sour.

Persons who got two tastes at the same time registered: 46 bitter-sweet, 5 bitter-sour, 3 bitter-salty, 13 sweet-sour, 7 sweet-salty.

Triple tastes were represented by: 13 bitter-sweet-sour, 8 bitter-sweet-salty and 2 sweet-sour-salty. Two other possible combinations, sour-salty and sweet-sour-salty, found no representative tasters among the group tested.

Science News Letter, January 28, 1939

MEDICINE

Distinction Drawn Between 'Flu and Similar Maladies

British Scientists Who First Isolated 'Flu Virus Prepare List of Differentiating Symptoms for Doctors

ALL IS NOT influenza that goes by that name, as even the layman may have begun to suspect. There has been a tendency in recent years, however, to label as influenza almost any attack of cough and cold with fever, especially if such attacks are prevalent in the community.

Since the virus of influenza has been isolated, the diagnosis in any particular case could be clinched by laboratory examination of material washed from the nose and throat of the patient. If the virus is found in this material, there is no doubt the patient really has influenza. Such procedures are not available to the majority of patients and their physicians, who must consequently still depend on clinical symptoms for making diagnoses.

The difficulty of distinguishing true influenza from other ailments with similar symptoms has been a problem not only for physicians treating patients but for the medical scientists seeking the cause and means of conquering influenza. To simplify the matter, the British scientists who first isolated the influenza virus, Drs. W. Smith, C. H. Andrewes and P. P. Laidlaw, called in the aid of some practising physicians, Drs. C. H. Stuart-Harris, D. K. M. Chalmers, E. G. H. Cowan and D. L. Hughes. Between them they have drawn up a table of signs that differentiate true influenza from what they call "febrile catarrh," which might be translated as cold and cough with fever.

In influenza, the onset is sudden, constitutional symptoms predominate, the cough is short and dry and the voice husky, while in the febrile catarrhs the onset is insidious, local nose and throat symptoms predominate, cough is paroxysmal and productive and the voice is hoarse. The white blood cell count is said not to be diagnostic. Physicians will find other distinguishing features given in the special report of the British Medical Research Council and summarized in the *Canadian Medical Association Journal*.

Science News Letter, January 28, 1939

ANTHROPOLOGY

Primitives Reckon Time; No Group Without It

PRIMITIVE people have their own sufficient ways of reckoning time. So it appears from a study of the Tena Indians in the Alaskan Yukon region, reported by Rev. Robert J. Sullivan, S. J., of Weston College in Massachusetts.

He finds that these Indians in their native state did not divide the day into hours. It never occurred to them to mark off a day by mealtimes, because they ate after rising and before going to bed, and took snacks at other times, provided they could find something to eat. Incidentally—though it has nothing to do with time—they called the morning meal "we eat" and the evening meal "we eat again."

Recurring day and night they were aware of. And sometimes a journey would be referred to as so many "sleeps" away. But in their aboriginal scheme of things the Tena Indians had no idea of a week or any other grouping of days into a larger unit.

They measured time from such broad landmarks as midwinter, when there would be great festivities, and midsummer, and the time when fish swam back.

The arrival of white men brought Tena Indians new time ideas to go with new customs. When missionaries taught the Indians to set aside Sunday as a day of rest, they had, for the first time, a reason for counting off a measured week.

To keep track of Sundays, Christianized Indians learned English day names. But they have also coined Indian names for four days. They call Sunday "the day." Monday is "the day after the day." Saturday is "the day before the day." Friday is named "when we do not eat meat."

Whether human beings have a sense of time remains to be fought out by philosophers, says Father Sullivan, but every human society has points of reference to which past and present and future happenings are related. Every group uses time in its order of living.

Science News Letter, January 28, 1939

CONSERVATION

New Museum Exhibits Teach Conservation

THE PICNIC: a Tragedy in Three Scenes, might appropriately be the title for one of the exhibits in the new Spaulding Hall of Conservation, recently opened at the Buffalo Museum of Science.

The central group shows a springtime scene before the coming of the picnickers. Trilliums, violets, spring beauties and other wildflowers carpet the ground, under the spreading boughs of a flowering dogwood in full bloom. A chipmunk dances on a log; songbirds are in the trees.

To one side is a smaller-scale panel showing the same spot just after a careless picnic party has left. The wildflowers have been ripped up or trampled down. The boughs are torn away from the dogwood. The place is littered with tin cans, a discarded newspaper, miscellaneous garbage. Worst of all, the campfire has been left burning.

At the other side, a similar panel shows the tragic third scene. The spring breeze has fanned the neglected fire. It has

HAVOC OF CARELESSNESS
More graphic than a thousand pages of print or a thousand hours of preachment, is the conservation lesson brought home by these three scenes recently unveiled at the Buffalo Museum of Science.

spread, feeding first on dead leaves, then on branches and brush, finally killing the trees and destroying or driving out all birds and other animals. Appropriate labels point the moral.

Other exhibits in the new hall include an autumn group and a bog group, each showing wildflowers and animal life appropriate to place and season. There is also a "behind-the-scenes" exhibit which shows all the stages in the difficult and intricate technique of making lifelike wax models of flowers.

The new hall was made possible through a gift of $10,000 from Mr. and Mrs. Harry B. Spaulding of Buffalo. The art work was executed by Paul and George Marchand, under the supervision of Director Carlos E. Cummings.

Science News Letter, January 28, 1939

PUBLIC HEALTH

1938 Birth Rate Up, Death Rate Is Down

AMERICA'S rate of population increase is up to six per 1,000 people. More babies were born in the United States last year than there were in 1937, and fewer of them died. Fewer of all of us died, as a matter of fact. There is a pretty good chance that, in spite of the "little depression," American health figures for the year will set a record.

A survey for the first half of 1938, recently published by the U. S. Public Health Service, indicates that:

"Another outstanding feature of the mortality record for the first six months of 1938 was the widespread decline in the infant mortality rate. Only five states reported a higher rate than for 1937, and the current rate is nearly nine per cent. less than that for last year.

"The birth rate for 1938 has continued slightly above that for 1937. This increase, combined with a lower death rate, has resulted in a crude rate of natural increase of 6.0 per 1,000 population, compared with the corresponding rate of 4.3 per 1,000 population for 1937.

For the population generally, the same six-month trend, if carried through the remainder of the year, will place the country's mortality rate at the lowest point on record, with the possible single exception of 1933. The rate for the first six months of 1938, 10.8 per 1,000 population, is only slightly higher than the low rate for 1933 and represents a decrease of 8.5 per cent. from the rate for 1937.

The drop in the influenza-pneumonia death rate is an important factor in this decline; but almost all diseases show similar steep declines in the numbers of their victims. Improvements in the tuberculosis and maternity mortality situations are cited as most encouraging. The campaigns for greater traffic safety seem to be succeeding.

Cancer, however, continues its ominous creep; mortality from this disease increased three per cent. over that for the same months in 1937.

Science News Letter, January 28, 1939

AGRICULTURE

Early Crop Improvement Held Mostly Unconscious

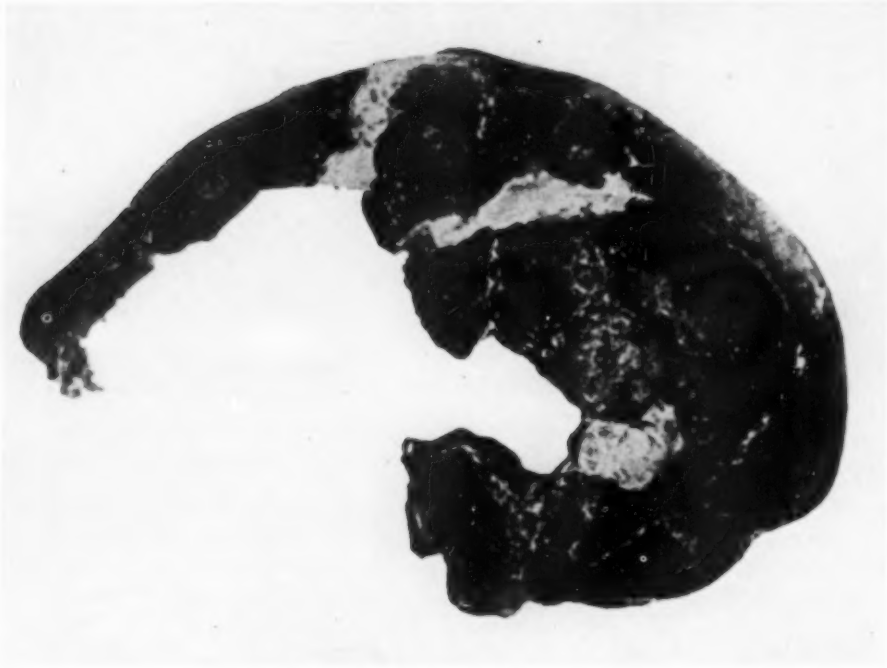
HOW did the first agricultural and pastoral peoples improve their crops and flocks? It is frequently assumed that primitive man showed a good deal of shrewdness, even wisdom, in selecting the foundation of next year's crop, of next generation's sheep and cattle. But Prof. J. B. S. Haldane, noted English biologist, thinks quite otherwise. Selection can be quite unconscious, he holds, and he thinks that in primitive times it was so, for the most part.

Writing in *The Modern Quarterly,* he points out, among other considerations, that "if one plant in a field produces twice as many grains as its neighbors it will, on the average, contribute twice as many individuals to next year's crop. Further, since most cereals and most leguminous plants are predominantly self-fertilized, high yield is strongly inherited, and thus unconscious selection is highly effective."

Automatic improvement of this kind occurs, however, only if the reproductive part of the plant is the thing it is grown for—seed in the case of grains, the tuber in the case of the potato. Conscious selection has to be exercised in picking out seeds or other propagules, if we are after thickness in stem, juiciness in leaves, or qualities of that kind. And it is notable that improvement in that class of crops has come later than in the grains and root-propagated vegetables.

With animals, the story is much the same. Our forefathers tended to keep for breeding purposes the earliest-maturing and most fertile of the animals they had domesticated. Indeed, those are prized qualities still. But in the wild state they may be even partial handicaps: "a female producing too large a litter, or too many eggs in a clutch, will be unable to rear most of her family."

Science News Letter, January 28, 1939



AFRICAN COUSIN OF JAVA APE-MAN?

One of the African skulls, after the fragments had been pieced together. The Pithecanthropus-like profile, with its low arch, massive eyebrow ridge, and heavy back portion, is easily recognizable.

ANTHROPOLOGY

Fossil Bones May Belong To Kin of Java Ape Man

ASSEMBLY of fossil bones found by a German explorer in East Africa, may reveal their possessors to have been close relatives of *Pithecanthropus erectus*, the famous Java Ape Man.

Fragments of two skulls have been assembled by Dr. Hans Weinert of Kiel, Germany. The remains were discovered in 1935 by Dr. F. Kohl-Larsen in the gravel at the northeast end of Lake Eyassi, Tanganyika Territory, thousands of miles away from the Ape Man it is said to resemble so closely, and in another continent altogether.

They were found associated with bones of a number of animals, antelopes, pigs and hyenas resembling those now living in the same country, but completely fossilized. It is maintained, therefore, that they date back about 100,000 years.

The animals found with the human bones also give an idea of the appearance of the East-African highlands at the time when Eyassi Man lived. The country then was an open savannah interrupted by scattered trees and by groves, and not so dry as it is at present.

The task of assembling the fragments was a very difficult one. There were about 200 of them, and, as Dr. Weinert says, a piece larger than a silver dollar was something extraordinary. Still the result has revealed a good deal of the skull cap of one, and part of the face of a second individual. The critical examination is still in progress.

Science News Letter, January 28, 1939

ETHNOLOGY

America Was News to Sixteenth Century China

THERE is an old story that dies hard, to the effect that a Chinese Buddhist monk discovered Mexico a thousand years before 1492.

Competent scientists and historians find nothing to uphold such a yarn. Yet it persists. A United States Congressman recently inquired about it at the National Library in Peiping.

In the circumstances, there is public interest in a new check-up on the facts by Dr. L. Carrington Goodrich, of Columbia University, reported to the *Geographical Review*. America, it appears, was news to China in the sixteenth century.

Syphilis was first noted in China in 1505; corn was accurately described there in 1573. The corn must have come from America, and the disease possibly did, though medical historians disagree keenly on the origin of syphilis. In any event, Chinese did not think of these things as betokening a strange New World.

America burst upon cultured Chinese in 1584, when Jesuit missionary Matteo Ricci, assisted by a Chinese interpreter, prepared a world map including the New World.

Dr. Goodrich says, "The map caused a sensation, not only in South China, but in the great centers of culture in the Yangtze Valley as well."

Several editions of the map were needed. In 1608 the emperor demanded a dozen copies.

Chinese must have got a strange first impression of the New World from notes on the map. Regarding Mexico, they were simply told:

"Mexico produces birds' feathers of divers colors. The people use them to make wonderful pictures: landscapes and portraits."

Patagonians were "not more than ten feet tall."

All this, as Dr. Goodrich emphasizes, does not mean that Chinese influences did not reach America, carried by Asiatic wanderers across Bering Strait. But there was no Chinese Columbus, and no knowledge of America's people in China until after 1492.

Science News Letter, January 28, 1939

PHYSICS

Magnetic Forces Aid Swedish Traffic Control

THE INVISIBLE but very real forces of magnetic fields are the best means which soon may be used in Sweden to solve that perennial traffic problem of getting vehicles from side streets across a main arterial highway with a maximum of safety and a minimum of delay to the main traffic flow.

From the American consulate at Stockholm comes word that a "sensitive road" signal is expected soon to be installed that solves the problem.

Buried in side streets near arterial highways would be covered electromagnets which radiate a small magnetic field. As automobiles, horse drawn vehicles,

motorcycles, and even bicycles and handcarts approach the intersection, the steel in them changes the magnetic field.

This magnetic change trips off the relay mechanism which turns the traffic light at the corner from red to green. This green signal lasts from 10 to 15 seconds and then gives the right of way back again to the main highway.

Should a vehicle from the side street be immediately followed by another, the latter is not given the green light before a minimum time for the green light in the main street has expired. In this way the traffic on the main highway can be prevented from being blocked by a stream of vehicles from the side street.

The only kind of vehicle which will not actuate the magnetic signal system is one which contains no iron, steel or other magnetic material.

An additional use of the Ericsson system, as it is known, is for an automatic traffic counter. The registering apparatus drives a reel of paper upon which it draws columns proportionate to the size of the traffic flow for a given time interval.

Science News Letter, January 28, 1939

GEOLOGY

Siberia's Frozen Ground Is Survival of Ice Age

THE ICE AGE is not a thing of the past. It survives underground, in the permanently frozen soil of Siberia and other high-latitude lands, where summer thaws out the soil to a depth of a few inches or a few feet, permitting plants to grow, while beneath, to an unknown depth, are earth and rock that have been ice-bound for a million years.

How this survival of the Pleistocene makes trouble for present-day engineers and other practical people was told at the meeting in New York of the Geological Society of America by Prof. George B. Cressey of Syracuse University.

All heavy construction in this area, undertaken by the Soviets, has to be built on piling. To soften the earth enough to permit the piles to be driven, steam jets have to be used. At one place, Igarha, a lumber mill engine stands on wooden "roots" that go down nearly 70 feet to bedrock.

Water mains give particular trouble. If the engineers cannot find unfrozen ground of sufficient depth, they have to lay the pipes in board-lined trenches, and along with the water mains they must install steam pipes to keep the water from freezing, with the whole filled in with sawdust or moss.

Science News Letter, January 28, 1939

ASTRONOMY

Limits of Universe Still Beyond Astronomers' Reach

Calculated Curvature of Space Much Too Confined For Known Density of Matter, Scientist Declares

ASTRONOMY has reached a temporary impasse in its attempts to figure out the curvature of space and the limits of the universe, said Prof. Howard P. Robertson, mathematical physicist of Princeton University, in the opening address of the 1939 Sigma Xi lecture series at Louisiana State University.

On the basis of present observation, relativity theory of the universe has led to a model of space which has so large a curvature that its limits—if you think of it as a huge ball—are much too confined, Prof. Robertson said.

Not Enough Matter

By Einstein's relativity theory curvature of space is linked with the density of matter within that space. To bring about the curvature indicated by present knowledge matter would have to have more than 60 times the density now observed by telescopes.

Moreover, continued Prof. Robertson, if the universe is thought of as expanding, the most distant nebulae would have had to be close together at some time about 1,000 million years ago. This vast time is much too short, however, for rocks are known on earth which are probably twice as old as this.

And the final dilemma of astronomy is that if the limits of the universe correspond to a sphere with radius of 500 million light years, then astronomers are now looking through present telescopes and seeing nearly to the ends of space.

With the 100-inch Mt. Wilson telescope, Prof. Robertson pointed out, Dr. Edwin Hubble has detected distant nebulae which are about 500 million light years away.

Few people seriously believe that astronomers are now looking to the end of space and believe that the new Mt. Palomar 200-inch telescope, when it goes into operation, will open new vistas for astronomy. Yet if space has limits now predicated this would not be so.

"We seem to have come to an impasse with this line of attack; I find myself unable to accept the model to which such so large a curvature almost inevitably leads, and unwilling to postulate *ad hoc* some new principle to lift myself over the difficulty," said Prof. Robertson. "Looking back over the assumptions involved in the determination of the present value of the curvature, we find that at many points the conclusion is sensitive to even relatively slight uncertainties; above all, the method is highly sensitive to lack of uniformity in the distribution of the nebulae, whether this be due to fluctuations in the statistical material or to large-scale structural features of the nebular system.

"That density gradients, of such a magnitude as to raise considerable doubt concerning the validity of the method, do in fact exist in regions closer to us than those emphasized in Hubble's surveys, is clearly shown by the recent survey of Shapley of some 75,000 nebulae brighter than the 18th magnitude in southern galactic latitudes.

Uneven Distribution

"On arbitrarily dividing all his material into the eastern and western hemispheres, Shapley finds that the number of nebulae per square degree in the former exceeds that in the latter by between 40 and 50 per cent; similarly he finds that the number of nebulae per square degree in the central portion of the plates taken from the southeast quadrant is more than twice the corresponding number for the northwest quadrant even although he is here dealing with a total of almost 20,000 nebulae.

"The existence of similar density gradients along the line of sight at the distances involved in Hubble's surveys might easily mask or distort the curvature effect which we are seeking; until more positive evidence on this point is available, it would therefore seem expedient to seek our additional datum elsewhere—perhaps most hopefully in an accurate determination of the deviations from the linear velocity-distance law at greater distances, for this effect should be much less sensitive to departures from the distribution implied by our homogeneous models."

Science News Letter, January 28, 1939

METEOROLOGY

Weather Bureau Re-Names The Radiometeorograph

THE U. S. Weather Bureau has re-christened the radiometeorograph, that featherweight little robot weather reporter that rides small balloons up into the stratosphere and wirelesses back all the news about how cold it is, how damp it is, etc. The new name is "radiosonde," a word of French origin that has already been officially adopted in Germany. (*Bulletin, American Meteorological Society*, Nov. 1938)

Objection to the name, meteorograph, was mainly to the "graph" part, which implies that the instrument makes a written record, which it does not do. Also, the word is a bit sesquipedalian (many-jointed, to you). "Sonde" is French for depth (or height) sounding: the rubber bubbles on which the radiosondes ride aloft are known technically as sounding balloons.

Science News Letter, January 28, 1939

GENERAL SCIENCE

Science Invites Criticism Of Its Facts by All Comers

SINCE science is having a profound and real effect on the world about us whether we wish it or not, there is need of knowing its possibilities and limitations.

No label of "science" upon the package of research will make it a cure-all.

Scientific philosophers, like Pearson, Poincaré and many others, have discoursed upon the method of science. To those who cry for action, this may seem dry and unimportant stuff. But thought and knowledge of method is always necessary that action may be correct.

A British scientist, Dr. William H. George, in a notable current book, "The Scientist in Action," explains that in its passionate and challenging devotion to facts, science is distinguished from all other human activities.

"Science neither has, nor desires, any protection whatever against statements of fact," he observes. "A passionate devotion to statement of fact outside of science may alienate a man from his friends, if not put him in a law court, prison, concentration camp, or before a firing squad. In certain circumstances, statement of fact without comment is libel or slander. Religion is protected by laws of blasphemy. Even militarism appears to be a delicate flower, needing special legal protection against statement of fact, even without comment. In science it is never impolite, immoral, disloyal, unpatriotic, or 'not done' to state facts."

To criticize the official statements of the ruler of a nation, Dr. George observes, may, according to the person, place and period, be a way of committing suicide. The official statements of a president of a national scientific society challenge critical examination by all.

Science News Letter, January 28, 1939

POPULATION

Debunk Belief on Negro Population Growth

BELIEF that America's Negro population is outstripping the white population in growth is unfounded in fact, Dr. Bernard D. Karpinos of the U. S. Public Health Service told the American Statistical Association.

Negroes actually had a lower net reproduction rate in 1930 than did the white population in that year, Dr. Karpinos declared in debunking a belief which has gained considerable credence in recent years. In that year the comparative rates were 1.08 for the whites as against 1.02 for Negroes.

Negroes have a higher crude birth rate but this does not mean that their population is increasing more rapidly. Among other factors operating to offset this higher rate is a higher death rate. Both factors combine to produce a population whose average age is younger, he explained.

Many of the assumptions of a rapidly increasing Negro population are based on a jump in their numbers in the 1920 to 1930 census figures. But the 1920 figures err seriously in having missed many of the Negro population.

Another basis for the erroneous belief, Dr. Kapinos pointed out, is in the apparent birth rate increase during those years. But the explanation of that lies not in increased fertility, but in the fact that the ratio between Negro men and women in the different cities was sadly out of balance around 1920 and only approached normality later. The explanation of this latter fact lies in the mass migrations of southern Negroes to the North during the World War to fill a hungry labor market. This northward migration consisted predominantly of males.

Negroes now number 9.7 per cent. of the population, This ratio is likely to continue, Dr. Karpinos concluded, with an outside possibility of the percentage rising as high as 11.6 per cent., but no higher.

Science News Letter, January 28, 1939

IN SCIENCE

METALLURGY

U. S. Magnesium Boom Due Within Five Years

THE BIGGEST boom among the metals in the next five years can be expected to occur in magnesium, the light metal only two-thirds as heavy as aluminum and one-quarter as heavy as copper. This forecast appears in the survey, prepared by the Federal Power Commission, of the nation's industrial electric power needs by 1942-1943.

The use of electricity by industry in chemical and metallurgical processes, the FPC points out, will probably increase—on an average—by some 33 per cent. during that time. But heading the list of anticipated gains is magnesium production with an electric power increase of 156 per cent.

This is based on the expected trend toward a production of about 10,000,000 pounds of magnesium metal each year. At present production is only about 4,000,000 pounds.

Hydro-electric development in the Pacific Northwest area, and in the Tennessee Valley region, is expected to furnish the cheap power, making possible the production of magnesium from its ores in these localities. At present America's production of magnesium metal is a by-product of chlorine and bromine production from the salt brines near Midland, Mich.

The company operating these wells is the nation's sole producer of primary magnesium metal. Government experts believe the current price (30 cents a pound) could be lessened by greater competition. As it is, magnesium's price has fallen from $5 a pound in 1915 in a manner paralleling the lowering of aluminum's cost.

With a falling price of magnesium there would be a stimulation of application of magnesium alloys in aircraft, transportation and in portable equipment. The FPC's estimates are based on normal trends. It is virtually impossible, they point out, to estimate the effects of a major war, a great swing in the cycle of general business activity or other extraordinary events.

Science News Letter, January 28, 1939

NCE FIELDS

BOTANY

Potatoes Went "Wrong Way" From England to Virginia

POTATOES were not introduced into England from Virginia by Sir Francis Drake or Sir Walter Raleigh or anybody else; they made the voyage in the other direction and were introduced into Virginia from England, by way of Bermuda.

This upset of what has always been accepted as history comes from a Field Museum publication, a posthumous work by the late Dr. Berthold Laufer.

There is no authentic record of potatoes in North America prior to 1621, Dr. Laufer declares. In that year the Virginia colonists, in dire distress because of crop failure, received a quantity of potatoes in a relief ship sent by the Governor of Bermuda. They saved enough for seed, and cultivation was thus established.

Yet a quarter of a century before that, the famous English herbalist, John Gerard, published an enthusiastic description of the potato, with a fairly accurate picture, stating that he had grown the plant in his own garden, from seed brought "from Virginia". This statement has been partly responsible for the long-held belief that the Virginia colonists learned potato planting from the Indians.

The apparent discrepancy does not bother Dr. Laufer, who points out that mis-labeled seeds and specimens are frequently received by even the best-managed of modern museums, so "why get excited over a wrong label of the sixteenth century?"

If it was an English potato that came to Virginia, it apparently was an Irish potato that emigrated to New England, for the record contains a story of introduction by Scotch-Irish colonists in New Hampshire in 1719.

Potatoes were first carried to Europe by the Spaniards, after their conquest of Peru. They were little appreciated in Spain, however, and it was not until they had become established in Italy that they had a really active center of cultivation, and a base from which they could make their way, usually against stiffly prejudiced opposition, into northern and western Europe.

Science News Letter, January 28, 1939

PSYCHOLOGY

Study of Averages May Mislead the Scientist

THE SPORT, or business, of racing, Dr. C. P. Stone, of Stanford University remarked at the recent A.A.A.S. meeting, is based on the interesting and often unpredictable way in which individual horses differ from one another.

When you put up two dollars on a race, you are not at all interested in the average running time of one-year-olds. Even the average time of Seabiscuit may seem irrelevant. What you want to know is what your favorite black filly is likely to do on a muddy track this afternoon.

In the field of business, statistics showing the average rate of decline of mental alertness with age are equally uninforming when it comes to deciding whether old Mr. Jones in the bookkeeping department should be retired or whether his intimate knowledge of the customers doesn't make up for the fact that he is a little deaf on the telephone.

Statistics, indispensable handmaiden to science, can actually obstruct the advance of knowledge if followed blindly.

If scientists allow the study of averages, trends, and totals to blind them to the interesting and often puzzling differences between individuals, many facts will remain hidden. The trees, in this case, will remain without clear form because obscured by the forest.

Averages can actually be misleading as well as uninforming. The idea that hunger is a more powerful drive than sex was cited by Dr. Stone as an example of how averages may obscure the facts. Looking only at the average behavior of a group of animals over a number of consecutive days, this conclusion is logical. But if you watch a particular animal you will find that although he becomes hungry often, that hunger will at times become relatively unimportant in his scheme of life. If the observations of his behavior were timed to coincide with the height of both drives, the averages might tell a different story.

Translated into the world of human affairs, though a man may spend most of his waking hours chasing dollars, we must not conclude that money means more to him than love or beauty or religion.

Statistics do not tell the whole tale.

Science News Letter, January 28, 1939

PALEONTOLOGY

Dodo Not a Myth, Lived Within Historic Time

See Front Cover

DODO is such a funny word that a good many persons get the idea that the creature itself was imaginary. But the dodo was a real bird, albeit just about as funny-looking as its name is funny-sounding. They lived on three of the Mascarene Islands, southwest of Madagascar. There were two species of Dodo, and a third closely related species, known as the Solitaire. All have been extinct since the coming of that extremely destructive animal, the European, in the seventeenth century.

The only actual remains of the Dodo now in European museums consist of one or two incomplete skeletons and a few other odd scraps like separate skulls and feet. Now the Field Museum in Chicago has a new sculptured restoration of the bird, carefully made according to best scientific methods by Frank Gino under the direction of Rudyerd Boulton, curator of birds. In addition to this model, the museum is displaying a series of drawings and paintings by Miss Laura Brey.

Science News Letter, January 28, 1939

SEISMOLOGY

Moon May Start Earthquakes By "Triggering" Stresses

SUGGESTION that the moon may have something to do with the setting off of earthquakes originating deep beneath the earth's surface was found in his mathematical studies of the question by Dr. Howard V. McMurry of Houston, Texas. Dr. McMurry does not consider this lunar influence as a now-established fact, but he has found enough evidence to make continued study of deep-focus earthquake records worth while.

The moon, according to this hypothesis, would set off earthquakes by adding tidal stresses to already existing stresses from other sources, that have brought the rocks almost to the breaking point. That is, the lunar tides would act as triggers to the already-loaded earthquake gun.

Two kinds of tides are involved: the tidal pull upon the earth's rocky crust itself, which is probably the more important of the two; and the ordinary tides in the ocean, which at regular intervals pile millions of tons of water above stressed rocks in seacoast regions.

Science News Letter, January 28, 1939

ASTRONOMY

Eclipsing Star

Algol, "the Demon," Once Thought to be Medusa's Eye, Is Really Twins, One Star Revolving Around the Other

By JAMES STOKLEY

THE FIGURE of Perseus, the "champion," directly above Cassiopeia, is shaped something like two large fish-hooks. One hook, which marks his foot, reaches almost to the Pleiades, in Taurus. Near this row is one of the most interesting stars in the sky, called Algol, and indicated on the maps. Like many star names, this one comes from the Arabic, a fact which is betrayed by the first two letters. "Al" is the Arabic article, or "the," and most star names starting with these letters, such as Aldebaran, Alnitak and Alcyone (which is the brightest of the Pleiades) are also Arabic.

Greek Into Arabic

The reason for this language having contributed so much to astronomical nomenclature is found in the fact that during the Dark Ages in Europe, the Arabs took many of the older Greek and Latin star names, converting them into Arabic. After the revival of learning, it was from the Arabic that they came back into European literature.

"Algol" is a corruption of "al Ghul," which means "the demon," and is rather curious, because the Arabs rarely gave uncomplimentary names to the stars. Perhaps they recognized something peculiar about it, the same thing, possibly, that led the Greeks and Romans to imagine that it marked the eye of Medusa, that terrible creature with hair of live snakes, whom Perseus killed.

An Englishman, named Goodricke, in 1783, was the first modern astronomer to recognize the peculiarity of Algol, and to give a correct explanation. For about two days eleven hours the star remains of its usual brightness, about second magnitude. In about five hours it loses about two-thirds of its brilliance, then in five more hours it returns to normal. The minimum occurs at intervals of 2 days, 20 hours, 49 minutes.

Goodricke's explanation was that Algol consists of two stars, one bright, one dark, revolving around each other once in this period. It happens that the plane in which they revolve is nearly in line with the earth, so, on every revolution of the dark body, it partially eclipses the bright one, thus reducing its light. However, the dark one is not entirely non-luminous, because modern studies have shown a slight reduction in the total light as the brighter companion passes in front of the dark one. The spectroscope, which analyzes the light of a star and permits us to tell whether they are moving towards or away from us, proves that this is the correct explanation. Just before the dark one eclipses the bright star, the latter is receding, while after eclipse it is coming towards us. The spectroscope shows this to be the case.

During February, it will be interesting to watch Algol and its changes. On February 3, 5, 11 and 28 the eclipse will occur during or close to the evening hours, and the star's brightness will be noticeably less than on other evenings. It would be a good idea to compare its brilliance with nearby stars on the various nights. A pair of opera glasses will help.

Winter Constellations

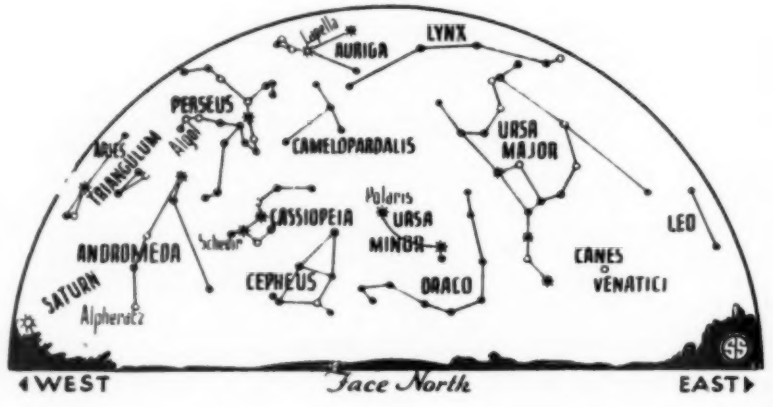
This month the magnificent winter constellations, which were so prominent during January, are still with us, and can be seen to better advantage. Directly south is Sirius, the dog-star, in Canis Major, the great dog. As Sirius, because of its relative proximity, shines more brightly than any other star visible in the night sky, it is easy to locate. But almost equally easy is the figure of Orion, the warrior, above and to the right of Sirius. Three stars in a row, called Anilam, Alnitak and Mintaka, form his belt. Above the belt is a bright star of reddish hue, Betelgeuse. This, with Bellatrix, a somewhat fainter star to the right, indicates his shoulders. On the opposite side of the belt is Rigel, which marks one of Orion's feet.

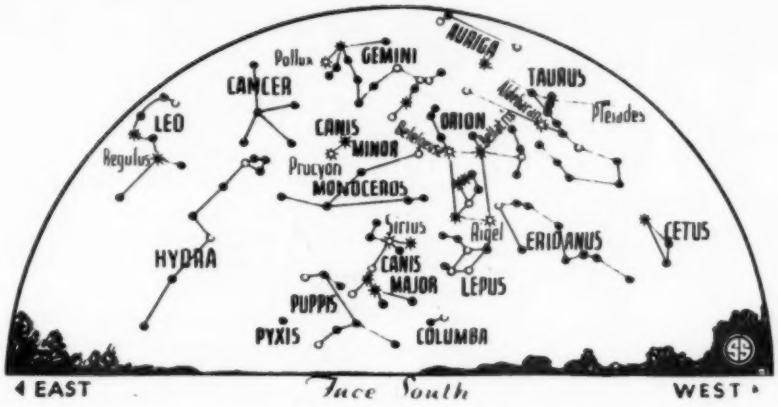
The Face of Taurus

Above Orion, and to the right, about as far from the belt as Sirius in the opposite direction, is a V-shaped group of stars called the Hyades. This outlines the face of Taurus, the bull, and the brightest star of the group, called Aldebaran, is one of his eyes. Where his shoulder would be, appear the Pleiades, a little cluster of stars often called the "seven sisters," and sometimes, though erroneously, the "little dipper." Most people have no trouble in seeing six of these stars, while unusually keen-eyed persons may see as many as ten or twelve. Many more can be seen through a good pair of binoculars, while a moderate sized telescope reveals hundreds.

Above Sirius and to the left is another dog, Canis Minor, in which is found the star Procyon. Still higher are Gemini, the twins, the most prominent stars being Castor and Pollux. Pollux, lower, is the brighter of the pair. Almost directly overhead is Capella, a star in the group called Auriga, the charioteer. But there is still another star of the first magnitude, not mentioned above. This is Regulus, in the lion, Leo, which is seen to the east. Part of this group forms the "sickle," named because it is shaped like that implement. Regulus is at the end of the handle, which is pointing to the southeastern horizon.

In the northeast, with handle down





ward, is the great dipper, part of Ursa Major, the great bear. The two uppermost stars are the pointers, indicating the direction of the Pole Star, itself at the end of the handle of the Little Dipper, and part of the little bear, Ursa Minor. In the northwest is the figure of Cassiopeia, shaped like a W lying on one side, and above is Perseus.

Four Planets Visible

All the objects mentioned above can be found on the accompanying maps, which show the appearance of the skies at 10:00 p. m., February 1; 9:00 p. m. on the 15th, and 8:00 p. m. on the 28th.

There is also indicated, low in the west, the planet Saturn, which is yellowish in color, and brighter than most of the stars. Saturn sets about four hours after the sun, while a second planet, Jupiter, can be seen just after sunset. It disappears about an hour after the sun. Mercury is not visible at all this month, but Mars, in the constellation of Scorpio, and of the first magnitude, rises toward the southeast about an hour after midnight. Its steady red glow makes it easily recognizable. Venus, in Sagittarius, the archer, comes up about two and a half hours before the sun, and is of magnitude minus 4, far brighter than any other star or planet.

Science News Letter, January 28, 1939

Celestial Time Table

Date		*Time (E.S.T.)*	*Event*
Fri.	3	1:33 a. m.	Algol at minimum brightness.
		7:00 p. m.	Moon nearest earth, distance 221,600 miles.
Sat.	4	2:55 a. m.	Full moon.
Sun.	5	10:23 p. m.	Algol at minimum.
Fri.	10	11:12 p. m.	Moon at last quarter.
Sat.	11	4:01 p. m.	Algol at minimum.
Sun.	12	7:30 a. m.	Moon passes Mars, less than four lunar diameters to the north.
Tue.	14	9:47 p. m.	Moon passes Venus, about three lunar diameters to the north.
Thu.	16	9:00 p. m.	Moon farthest from earth, distance 252,600 miles.
Sat.	18	9:00 p. m.	Mercury in line with sun.
Sun.	19	3:28 a. m.	New moon.
Mon.	20	7:25 a. m.	Moon passes Jupiter, about eleven lunar diameters to the north.
Thu.	23	12:43 a. m.	Moon passes Saturn, about nine lunar diameters to the north.
Sun.	26	12:08 a. m.	Algol at minimum.
		10:26 p. m.	Moon at first quarter.
Tue.	28	8:57 p. m.	Algol at minimum.

Science News Letter, January 28, 1939

● Earth Trembles

Information collected by Science Service from seismological observatories and relayed to the U. S. Coast nd Geodetic Survey and the Jesuit Seismological Association resulted in the location of the following preliminary epicenter:

Friday, January 20, 5:40.3 p. m., E.S.T.

Off Pacific coast of Central America. Latitude 13 degrees north, longitude 90 degrees west, approximately.

For stations cooperating with Science Service in reporting earthquakes recorded on their seismographs see SNL May 21, 1938.

PHYSICS

High-Speed Electrons Create Strange Glow

HIGH-SPEED "bullets" from the "atom gun" at the University of Notre Dame are being used to study a strange bluish-white light which is found in liquids when they are bombarded with swift-traveling electrons.

This strange light, known as Cerenkov radiation after the Russian scientist, P. A. Cerenkov, who discovered it in 1934, is produced when the electrons are traveling through a liquid with a speed greater than the speed of light in that liquid.

The original discovery was made with beta-ray electrons given off by radium. These electrons come off with all sorts of speeds. While they were useful in creating the faint blue-white light in a liquid they could not be used for a quantitative study of the phenomenon.

Controlled Electrons

Prof. George B. Collins and Victor G. Reiling of Notre Dame, therefore, took up the light's study, using electrons whose speed and energy were definitely controllable. Electrons having energies of 2,000,000 electron-volts from Notre Dame's electrostatic generator were used.

These swift electrons were shot into a vessel containing a liquid and a small sheet of mica or cellophane. The light produced was caught and analyzed by a spectograph placed at right angles. Alcohol, benzene and water were the three liquids used.

It was found that the radiation was continuous and extended from the long-wave sensitivity of the spectrum plate into the region of the ultraviolet where absorption occurs in the particular liquid used.

The intensity of the Cerenkov rays was found to be greater in the shorter wave lengths than are rays produced by a tungsten lamp in the same region.

The theory of the origin of the rays had previously been worked out by the Soviet scientists I. Frank and Ig. Tamm from Cerenkov's original work. This theory was confirmed by the Notre Dame work.

Science News Letter, January 28, 1939

● Adventures in Science

Science Service's radio program presenting news and interpretations of science with noted scientists as guest speakers. Over the nation-wide network of the Columbia Broadcasting System, Thursdays, 7:15 p. m. EST. Listen in!

CHEMISTRY

44 Gases Used in World War; New Ones Promised for Next

Chlorine, Bromine, Arsenic and Ethyl Radicle Figure Prominently in Numerous Lethal Compounds

HERE are the most important known poison gases which have been found effective in warfare. Many of them were developed and used during the World War. Others, in addition, will be used if war now comes to Europe.

1. *Mustard Gas.* Chemically is dichloroethyl sulfide. In pure state almost odorless. In World War smelled like mustard or garlic. Heavy, oily liquid of dark straw color. Evaporates slowly at ordinary temperatures. Thus a persistent type of gas. Frequently diluted with another poison, chloropicrin, to keep it liquid in colder weather. Has delayed action on body. First symptoms itching and blistering. Especially damaging to eye's cornea. In eye, tissue degeneration begins two minutes after exposure to dilute concentrations. If gas is swallowed symptoms of nausea, vomiting and diarrhea develop. Gas very penetrating. Goes through ordinary clothing, rubber and even leather. Is 50 times as toxic as chlorine.

2. *Chlorine Gas.* First gas used in World War. Two and a half times as heavy as air. Clings to ground. Fills shell holes, depressions and dugouts. Greatest action occurs in presence of moisture. Major action is on respiratory tract with symptoms of choking, coughing and suffocation.

3. *Phosgene Gas.* A combination of carbon monoxide and chlorine. Resembles chlorine in action but has a more delayed effect. Is ten times as toxic as chlorine. First symptoms very minor. Its effectiveness mainly due to initial innocuous character. Its menace is revealed only after considerable gassing has occurred.

4. *Lewisite.* Known chemically as chloro-vinyl-dichloro-arsine. Developed secretly during World War by Capt. W. Lee Lewis of U. S. Chemical Warfare Service. War ended just before gas entered combat use. Has all blistering properties of mustard gas but more effective because it has ability to penetrate the skin. Three drops, placed on rat's abdomen, causes death in two to three hours. Is powerful respiratory irritant. Produces violent sneezing. Another variety called beta-beta-prime-chloro-vinyl-dichloro-arsine has less blistering effect but its irritation on respiratory system is much more severe.

5. *Toxic smokes.* Chemically are diphenyl-chloro-arsine and diphenyl-cyano-arsine. Popularly called sneezing gas. Are really finely divided dusts. Can pass through ordinary gas masks unless special filter attachments are provided. Effective in concentrations of one part in 10,000,000, of air. In higher concentrations cause vomiting. Considered as poisonous as phosgene in equal concentrations.

6. *Crying Gas.* Twenty-three different varieties used in World War. All intended to produce temporary disability and confusion. Favorite German lachrymatory gas was xylyl bromide. Among Allies chloropicrin was widely used.

In all some 44 individual gases and mixtures of gases were employed by the combatant nations from 1915 to 1918. Their names follow:

Acrolein; arsenic chloride; benzyl iodide; benzyl chloride; bromoacetone; bromobenzylcyanide; bromomethylethylketone; benzyl bromide; chlorine; chlorosulfonic acid; chloroacetone; chlorobenzene; chloropicrin; cyanogen bromide; dichloromethylether; diphenylchloroarsine; dichloroethylsulfide; ethyldichloroarsine; ethyliodoacetate; hydrocyanic acid; methylchlorosulfonate; monochloromethylchloroformate; phosgene; phenylcarbylamine chloride; trichlormethylchloroformate; stannic chloride; sulfuric anhydride; xylyl bromide.

And mixtures of: bromoacetone and chloroacetone; chlorine and phosgene; chlorine and chloropicrin; chloropicrin and hydrogen sulfide; chloropicrin and stannic chloride; chloropicrin and phosgene; dichloroethyl sulfide and chlorobenzene; ethyl carbazol and diphenylcyanoarsine; ethyldichloroarsine and dichloromethylether; ethyliodoacetate and alcohol; hydrocyanic acid, chloroform and arsenious chloride; hydrocyanic acid, arsenious chloride, stannic chloride and chloroform; phosgene and arsenious chloride; dichloroethyl sulfide and carbon tetrachloride; phosgene and stannic chloride; methyl sulfate and chloromethyl sulfate.

Science News Letter, January 28, 1939

BOOKS

SCIENCE NEWS LETTER will obtain for you any American book or magazine in print. Send check or money order to cover regular retail price and we will pay postage in the United States. If price is unknown, send $5 and the change will be returned. When publications are free, send 10c for handling. Address:

Book Department
SCIENCE NEWS LETTER
2101 Constitution Ave.
Washington, D. C.

ENGINEERING

Industrial Research Cuts Costs to Consumer

INDUSTRIAL research does many things but where it comes nearest to most folks is in the improved quality of many products and in lowered costs to the ultimate purchaser.

Back in 1918 we bought what we thought was a pretty good rubber tire for our automobiles whose rate of wear was such that for every mile the car traveled it took 2.15 cents out of our pocket. Today, twenty years later, automobile tire cost per mile of travel is less than a third of a cent.

Intensive research on the ways to produce a longer wearing, more rugged rubber and on ways to fabricate more easily and with greater control over the quality of the output, is the answer.

In comparable fashion is the automobile itself. In 1925 a good car, by the standards of that day, cost $1,000. Twelve years later, in 1937, a better car sold for only $700.

Before the forum of the American Engineering Council, T. A. Boyd of the research division of the General Motors Company cited these examples of what research can do for the consumer.

Reviewing research progress over various lengths of time, Mr. Boyd noted the following lowering of costs:

Research over a period of between 10 and 14 years:

Electric refrigerators dropped in cost from $334 to $169, telephone message for 970 miles decreased from $7.50 to $2.75, rayon yarn from $2 a pound to 50 cents a pound, ammonia from 7.5

cents a pound to 4.5 cents, and methanol from 67.5 cents a gallon to 33 cents.

In the period of research covering 15 to 20 years:

Radio sets from $200 to $50, gasoline from 31.4 cents a gallon to 14.3 cents, camphor (natural) $3.75 a pound to 30 cents (synthetic).

Such a list could go on indefinitely but it would still omit a perhaps even greater aspect of research: the formulation of new industries which never before have existed.

Science News Letter, January 28, 1939

PHYSICS

Newest Vacuum Pumps Create Low Pressure

THE EMPTIEST man-made space ever attained is now being created by the newest vacuum pumps which use oil molecules to sweep out the air from scientific apparatus.

While it is impossible to produce a perfect vacuum, a vacuum can be created in which it is possible for a molecule to travel nearly 500 feet (15,000 centimeters) before it would encounter another molecule.

Since a molecule is only about .0000001 centimeter in diameter, it means that in travelling 15,000 centimeters the molecule goes over 100,000,000,000 times its own length before encountering a companion. Here, truly, is loneliness.

If the same emptiness were applied to people it would mean that a man 5.2 feet tall would have to travel over 100,000,000 miles before meeting anyone. The loneliness would be much greater than if there was only one man on the earth and another on the sun.

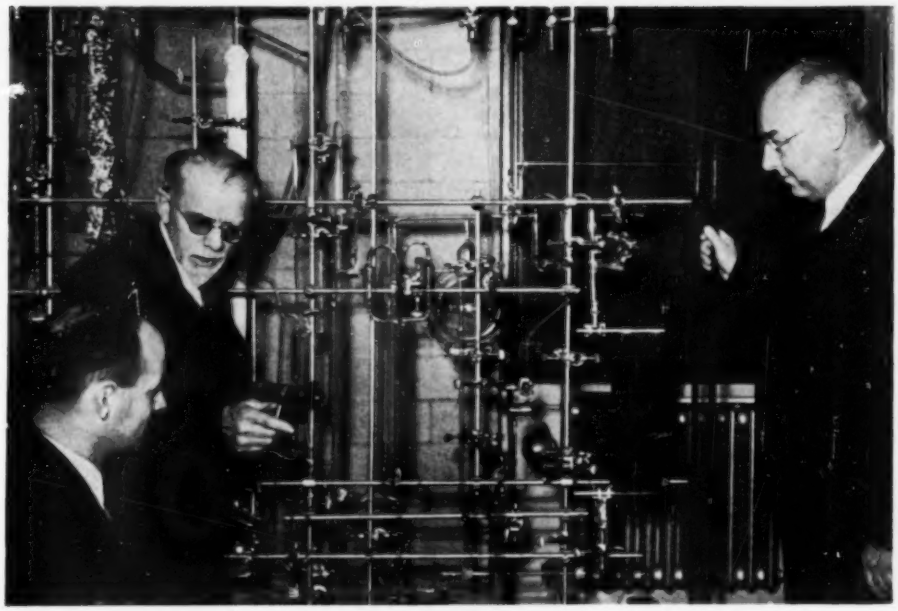
In terms of atmospheric pressures the new oil diffusion pumps, as they are known, can produce pressures of .0000000005 millimeter of mercury without the use of cooling traps of liquid air.

Normal atmospheric pressure is 760 millimeters of mercury, which is more than a billion times that attained in the newest oil diffusion pumps.

In operation the new pumps consist of elaborate and beautiful glassware arranged in tubes and columns to make a complete circuit for the oil vapor.

The oil is heated at one point in the circuit and the vapor flows around the loop. As the flow passes a specific point it comes by an opening leading to the chamber to be evacuated. Molecules of air coming out this opening are bumped by the oil molecules and the latter knock the air molecules away from the container being evacuated.

Science News Letter, January 28, 1939



AT DEDICATION

An elaborate set of apparatus in the new chemical research laboratory of Brown University dedicated on December 28. Pres. Henry M. Wriston, right, looks on as Prof. Charles A. Kraus, center, president-elect of the American Chemical Society, discusses the set-up with Prof. John P. Howe.

PUBLIC HEALTH

Men Suffer For Beauty, Too; Permanent Scars Reported

THE PRICE of manly beauty sometimes comes high. Take the matter of dekinking hair on the closely cropped male pate.

From Harlem Hospital, New York, comes the report of two cases of painful burns and probably permanent scarring resulting from such attempts at hair straightening. Dr. Frederic Lewis and John V. Scudi, reporting the cases (*Journal, American Medical Association,* Jan. 7), say that the men who use hair straighteners are principally, but by no means exclusively, Negroes.

Hair straighteners developed for men contain caustics, notably sodium hydroxide, which converts the hair protein to a gel. When not applied with great care, severe burns may result.

One of the men who suffered long for sweet beauty's sake looked, when the doctor first saw him, as if he had second degree lye burns. He had applied the hair straightening cream to his own woolly head, and had let the rinse water trickle down his face. He was three weeks in Harlem Hospital. His scars are probably permanent.

Case No. 2 has a large white expanse on his otherwise chocolate forehead. As Dr. Lewis and Mr. Scudi report the case:

While applying a cream for the purpose of straightening the patient's hair, the barber got to talking of "women people." Original sin haunted that barbershop and for fully five minutes enraptured its proprietor. The client made efforts to tell the barber that something was burning his forehead.

"The sequelae are not accurately remembered by the patient. There were several days of soreness, then crust formation and gradual exfoliation (scaling). The depigmentation (loss of color) proved enduring, but the straightening of the hair, alas, was transient."

Hair straighteners on the market have been found to be within the limit set by the Federal Caustic Poison Act, but there can be no regulation of their manufacture in the home and barbershop, the New York doctors point out.

Much of the peril lies, they believe, with such synthesizing amateurs who would do miracles of straightening.

Science News Letter, January 28, 1939

PSYCHIATRY

New Year Will Bring Attack On Causes of Mental Ills

THE present year will see battle along a new front to save America's minds.

Inspired by a cooperative program of the U. S. Public Health Service, psychiatrists are placing new emphasis on discovering what social conditions put so much pressure and strain on the human mind that it disintegrates.

The perennial battle between those who regard environment as the determiner of intelligence and mental health, and those who believe our physical heredity settles such matters for us, is by no means settled. But many professional men have considered it wise to assume that both factors play an important part and that of the two environment is far more easily modified, for humans at least.

The idea that the hustle and bustle and complicated conventions of modern civilized life are responsible for our tremendous incidence of mental disease has been exploded by those who find men in far-away South Africa and other primitive societies suffering from the same mental diseases as affect the minds of dwellers in the most up-to-the-second cities.

But one factor has been found in many sorts of societies as contributing to mental illness. That is man's inhumanity to man. Wherever men are humiliated, not for transgressions but for poverty, physical appearance, accidents of birth, or other uncontrollable conditions, there men go mad.

The social outcast, the one who is made to feel that he does not belong, is right now a potential patient for the mental hospital.

Men do not go mad, the scientists conclude, because they trouble themselves with problems that are beyond the comprehension of their intellects.

But they do break down in the face of such problems if they are forced by some outside pressure to find an answer, to take some action.

A man who cannot discover how to earn his daily bread may still keep his mind, yet he will lose it when the cries of his children force him to give them food where there is no food.

Science News Letter, January 28, 1939

ENGINEERING—PSYCHOLOGY

Engineers Coin New Term, Called See-Level

EVERYONE has heard of sea level but did you ever hear of see-levels? Probably not, for the term is one of the newest in the science of illumination and human seeing.

In a report to the Illuminating Engineering Society, Drs. Matthew Luckiesh and Frank K. Moss of the Lighting Research Laboratory, Nela Park, Cleveland, describe the four thresholds of visibility and two supra-thresholds involving performance and ease in seeing. These are the see-levels.

Highest level is known as maximal ease of seeing. It represents seeing with the least wear and tear on human eyesight, to express it in everyday language.

Next highest is the level of maximal production or achievement. Here, as illumination is increased, a stage can finally be reached where additional light will not aid the performance of a given task. Attainment of this see-level, however, gives no thought to ease of seeing as does the first.

Below these two supra-levels comes an upper threshold of visual function; a point where the details of an object can be distinguished correctly all the time. After such 100 per cent. certainty is gained, better seeing cannot produce greater certainty.

Going down the scale, comes minimal threshold of recognition, where seeing is so poor that half the time one cannot distinguish details. Obviously the same record could be made by guessing for identification of details.

Going down farther still, comes the upper threshold of crude seeing, in which only the presence or absence of an object needs to be determined. At this low level of seeing, as in night time driving, it is only necessary to recognize 100 per cent. of the time that some object is in view.

Lower threshold of this same type of seeing is the point at which the presence of an object is determined only half the time. Here again a guess would give the same result. This point is the absolute bottom of the human seeing scale and beneath it comes only blackness and invisibility.

Science News Letter, January 28, 1939

MINING

Paper Bags of Rock Dust Prevent Dust Explosions

CLOUDS of inert rock dust form an effective way of preventing and limiting disastrous coal mine dust explosions, it is announced by the U. S. Bureau of Mines.

Coal miners may shortly see strange paper bags on little platforms near the ceilings of mines, if the new method, just investigated by the Bureau, is widely adopted.

The paper bags contain limestone treated so that it does not absorb water. When the first shock wave of an explosion sweeps down a coal mine and blows coal dust with it, the vibration makes these bags fall off their teetering platforms. A wire through the bag rips it open and down falls a dusty shower of inert rock powder.

This dust barrier wall, as it is called, has two functions. If it falls into coal dust so heated that it is about to explode, the rock dust will absorb heat and act to lower the temperature below the ignition point of the coal dust and thus help to prevent further explosion. Also the presence of a sizable mass of inert rock powder in the air helps dilute the coal dust and makes the explosion less severe.

Science News Letter, January 28, 1939

Science News Letter Subscription Coupon

To Science News Letter, 2101 Constitution Avenue, Washington, D. C.

☐ Start ☐ Renew my subscription to SCIENCE NEWS LETTER for ☐ 1 year, $5 ☐ 2 years, $7

Name_____

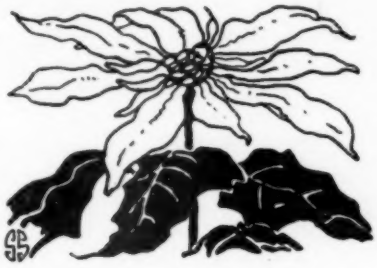
Street Address_____

City and State_____

(No extra postage to anywhere in the world)

BOTANY

NATURE RAMBLINGS
by Frank Thone



A New Start

POINSETTIAS that bloomed bravely at Christmas are looking very sick and discouraged now, most of them. Their leaves have fallen off and the flaming circle of their flowering crowns droops wearily. What to do about it?

Put them away in a cool corner in the basement and do not water them, advises the *Missouri Botanical Garden Bulletin*. That's all you will need to do until late spring.

In May (or even June or early July) cut the bare stalks off about a foot above the rim of the pot. Shake some of the soil from the roots and re-pot into a six- or seven-inch pot.

Then sink the pot into the soil in a sunny place in the garden. Keep it watered moderately. In a few weeks several shoots will appear. Pinch off all but two or three of them. The branches will grow very rapidly, and should be given support. Lift the pot out of the ground and take it into the house in September.

Lift the pot occasionally. If this is not done, a large root will grow out through the hole in the bottom, and when this is severed, on taking the plant into the house in autumn, the shock will cause the plant to lose its leaves and become dormant.

Setting the plant into the open soil is attempted by some persons. Poinsettias treated in this way will grow enormously during the summer, but it is impossible to pot them successfully in autumn. Cutting the roots always sends them into immediate dormancy.

Whatever you do with a poinsettia, indoors or out, never let it get cold. Remember, poinsettias come from the Gulf Coast lowlands of Mexico, and are tropical plants in every sense of the word. Summer and winter, they must be kept warm.

Science News Letter, January 28, 1939

BASIC PATENT DECISIONS

by Charles Cottingham, Master of Patent Law, and Examiner, U. S. Patent Office for 20 years.

Some 230 leading decisions bearing on Office Practice and Patentability. Briefed, alphabetically arranged and cross-referenced as to subject matter. Card 12″ by 36″ (in crosswise columns for folding).

4th edition, revised to 1939 - - - $1.00

Charles Cottingham
1111 Prince St. Alexandria, Va.

MATHEMATICS

Mathematical Computation For Chances of Reform

A MATHEMATICAL computation may give a method of predicting whether a prisoner may be expected to "go straight" and adjust to outside life when released from jail.

Dr. Ruth Struik of Belmont, Mass., and Dr. Miriam van Waters of Framingham, Mass., for two years have endeavored to reduce to mathematical symbols life histories of women offenders in the Massachusetts Reformatory for Women. These symbols are then combined and analyzed so as to give a prediction as to whether each woman will readjust to life after release.

To the American Mathematical Society meeting at the College of William and Mary they announced that a number of satisfactory correlations between predictions have been obtained, but that it is still too early to be certain that it is strictly possible to predict human behavior on this basis.

Wrap in Doughnut Surface

MATHEMATICS says that the surface of a doughnut can be wrapped around the surface of a ball.

The famous theorem due to the German Riemann and the Frenchman Poincaré that asserts this possibility has been proved and generalized by purely algebraic methods. This achievement was reported by Dr. O. P. G. Schilling, of Johns Hopkins University.

More generalized surfaces like pretzels are also used by the mathematicians. One easy way to make up a pretzel is to attach to an ordinary sphere four or five handles, just like the handles of a jug.

If such a pretzel is wrapped around a ball, it will usually cover the surface of the ball several times over, except for a few points where it must fold over or cross through itself. Such points are called branch points. The famous theorem generalized by Prof. Schilling states that you can always wrap up a ball so that it is covered a given number of times and has certain specified points as its branch points. Furthermore, you can specify in advance certain permutations or interchanges among the points of the pretzel. They form a so-called "group."

Prof. Schilling's new proof gives this theorem in a number of cases without using the deeper notions of mathematical analysis. The proof applies equally well to surfaces built up with ordinary numbers or with other, more bizarre number systems. It even works for number systems in which the number one added to itself seven times (or thirteen times, or any prime number of times) gives always zero!

Study Stirring of Coffee

A BIT of mathematics was sprinkled into the American breakfast coffee cup and the verdict is that it is not necessary to be too careful in stirring your coffee.

This is one of the consequences of some new theorems presented to the American Mathematical Society by J. C. Oxtoby, one of Harvard's junior fellows who is researching in mathematics.

His paper concerned "metrically transitive" transformations. A single stir of a cup of coffee is one example of a transformation: it carries, or "transforms," each drop of coffee to some definite new position in the cup. Mr. Oxtoby's methods applied to this particular case show with mathematical certainty that if such a single stir, or transformation, is applied repeatedly, it is almost certain that every bit of coffee will ultimately be adjacent to some drop of cream.

Science News Letter, January 28, 1939

•First Glances at New Books

General Science

THE SCIENTIST IN ACTION—William H. George—*Emerson Books,* 354, p., $3. Everyone who does or interprets or relies upon scientific research should get some grasp of the ideas and principles set forth in this study of scientific method by a British scientist. It is not just scientific philosophy but a thought-provoking consideration of what science is and what it can do. See also page 56.

Science News Letter, January 28, 1939

Geology

FOSSILS—Harvey C. Markman—*Colo. Museum of Natural Hist.,* 96 p., 30 c. A well-illustrated popular pamphlet giving the essentials about fossils in one of the most richly fossiliferous states in the Union.

Science News Letter, January 28, 1939

Bibliography

INDEX TO THE LITERATURE OF FOOD INVESTIGATION — Agnes Elisabeth Glennie, Gwen Davies, and Catherine Robson, compilers—*British Library of Information,* 94 p., $1.35.

Science News Letter, January 28, 1939

General Science

REPORT OF THE SECRETARY OF THE SMITHSONIAN INSTITUTION FOR THE YEAR ENDED JUNE 30, 1938—*Govt. Print. Off.,* 119 p., 15 c.

Science News Letter, January 28, 1939

Botany

THE AMERICAN PLANT MIGRATION. Part I: The Potato—Berthold Laufer—*Field Museum,* 132 p., illus., $1.50. See page 57.

Science News Letter, January 28, 1939

Education

EDUCATIONAL WORK IN MUSEUMS OF THE UNITED STATES—Grace Fisher Ramsey—*Wilson,* 289 p., $2.50. A useful consideration of development, methods and trends by the American Museum of Natural History's associate curator of education.

Science News Letter, January 28, 1939

History

ALLEGHENY COUNTY, A SESQUI-CENTENNIAL REVIEW—George E. Kelly, ed.—*Allegheny County Sesqui-Centennial Comm., Pittsburgh,* 392 p., $1.75. Western Pennsylvania was still pioneer country when Allegheny County was organized in 1788. The history of its growth is typical of the growth of our nation—an incredible growth in a relatively short period. This popularly written book is the work of 19 authors, each covering a special phase, such as politics, agriculture, medicine, science, and architecture.

Science News Letter, January 28, 1939

Education

ON GOING TO COLLEGE, A Symposium—*Oxford Univ. Press,* 298 p., $2.50. Not a "practical" book in the sense that it tells the college freshman how to study, what to eat, etc., but an attempt by understanding authorities to give some liberal intellectual perspective for undergraduate life. Dr. Arthur H. Compton writes the natural sciences chapter, Prof. John F. Dashiell treats psychology, while other fields covered include the ancient classics, literature, foreign languages, history, social sciences, philosophy, religion, dramatics, fine arts and music.

Science News Letter, January 28, 1939

Law

THE INTERNATIONAL PROTECTION OF LITERARY AND ARTISTIC PROPERTY—Stephen P. Ladas—*Macmillan,* 2 vols., 1273 p., $8.50. A comprehensive and authoritative treatise on an important and tangled problem. Copyright in the United States is dealt with in detail, as are international and inter-American copyrights and the laws of various countries.

Science News Letter, January 28, 1939

Botany

COMMON EDIBLE AND POISONOUS MUSHROOMS OF SOUTHEASTERN MICHIGAN—Alexander H. Smith—*Cranbrook Inst. of Science,* 71 p., 15 plates, paper, 50 c., cloth, $1. This attractive, well-illustrated little book not only aids you in telling the good ones from the bad ones, but contains practical hints for preparing the good ones for the table. Useful far beyond the restricted geographical limits it sets for itself.

Science News Letter, January 28, 1939

Education—General Science

ENGLISH FOR STUDENTS IN APPLIED SCIENCES—S. A. Harbarger, W. R. Dumble, W. R. Hildreth and Bert Emsley—*McGraw-Hill,* 260 p., $2. Recommended also to some of the scientists who write scientific papers.

Science News Letter, January 28, 1939

Engineering

HISTORY OF THE GAS INDUSTRY—Louis Stotz and Alexander Jamison—*pub. by author,* 534 p., illus., $3.50. The uses of gas for fuel, light, refrigeration reviewed in the past and in the present.

Science News Letter, January 28, 1939

Naval Science

THE NAVAL CALENDAR—E. C. Talbot-Booth—*Appleton-Century,* 272 p., $2.50. Up-to-date information about all fighting ships now in commission or building, compacted into a little book small enough to slip into a coat pocket. Less discussion than in *Jane's* or *Brassey's,* and of course smaller pictures; but essential data, so far as they are known, are all given.

Science News Letter, January 28, 1939

General Science—Sociology

MONEY TO BURN — Horace Coon — *Longmans, Green,* 352 p., $3. Philanthropy on a large scale is a distinctly American development. The great foundations have a tremendous effect upon the progress of science and education. This study of present-day endowments raises many questions of public as well as professional interest. Chapters are devoted to "Dollars Advance Science" and "Public Health and Private Philanthropy."

Science News Letter, January 28, 1939

Political Science

GOVERNMENT SPENDING AND ECONOMIC RECOVERY—Charles F. Phillips and J. V. Garland—*Wilson,* 404 p., $2. First of a series to be known as the Contemporary Social Problems Discussion Series, this volume is written by the assistant professor of economics and the director of debate at Colgate University.

Science News Letter, January 28, 1939

Economics

CAPITAL, CONSUMPTION AND ADJUSTMENT — Solomon Fabricant — *National Bureau of Economic Research,* 271 p., $2.75. Covering the period since 1918 in the United States, this is related to the other National Bureau's studies.

Science News Letter, January 28, 1939

Political Science

EQUALITY AND THE LAW—Louis A. Warsoff—*Liveright,* 324 p., $3. To the constitutional lawyer at least all men can be considered equal. This is a thorough study of the history, uses and abuses of legal equality.

Science News Letter, January 28, 1939

Documentation

PUBLIC DOCUMENTS, with ARCHIVES AND LIBRARIES—Jerome K. Wilcox and A. F. Kuhlman, eds.—*American Library Assn.,* 429 p., planographed, $5. Papers presented at the 1938 ALA conference.

Science News Letter, January 28, 1939